Space Weather Forecast

Issued on Tuesday, 24 September 2024 at 01:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor Geomagnetic Storm likely, mainly Day 2 (25 Sep) due to coronal hole fast wind and a possible glancing blow CME. Chance of M-flares (R1-R2 Blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate with a Moderate-class flare peaking at 23/1457 UTC from a new region on the southeast limb with a contribution from a region in the northwest. There are currently nine sunspot regions on the visible disc, with a further new region developing in the southeast. The region in the northwest has been fading, but still just about contains some magnetic complexity. The new region on the southeast limb remains very difficult to assess due to foreshortening near the limb, but is showing some notable looping in SDO imagery, so is one to watch. Remaining regions appear mostly small or simple at the present time.

A Coronal Mass Ejection (CME) was observed 22-23 Sep, directed primarily to the south and east, mostly away from Earth. However, analysis suggests a possible glancing blow on Day 2 (25 Sep), likely from the shock associated with the CME. No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind showed an increase to slightly elevated levels, likely due to a weak CME arrival around 23/1140 UTC. Wind speeds were initially near 350 km/s, increasing to vary between 380-460 km/s after the CME arrival. Interplanetary Magnetic Field was mostly weak at first, becoming moderate after the CME arrival. The north-south component was initially weakly variable, becoming moderately southward directed after the CME arrival, then rotating to become northward directed around 23/1535 UTC. Geomagnetic activity was Quiet (Kp 0-2), becoming Unsettled to Active (Kp 3-4) between 23/0900-1800 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a chance of isolated Moderate-class flares.

Solar Wind / Geomagnetic Activity: The CME following a flare off the southeast quadrant on 22 Sep may give a glancing blow at Earth on Day 2 with effects potentially lasting into Day 3 (25-26 Sep). This may coincide with the arrival of a coronal hole fast wind. However, this is aspect of the forecast is considered to be low confidence. Solar wind speeds are currently slightly elevated under the influence of what appears to be a weak transient CME, and are likely to remain so with the arrival of any connection to the fast wind. If we also experience a glancing blow from the above mentioned CME then wind speeds could potentially become elevated.

Geomagnetic activity is forecast to be Quiet to Active at first, with a slight chance of G1/Minor Storm intervals under weak CME influence. If we see a combination of fast winds and CME influence on Days 2-3 then this will bring a likelihood of Active to G1/Minor Storm intervals. However, if we see more significant influence from the CME, then geomagnetic activity could become more significantly enhanced, with a slight chance of reaching G2-G3/Moderate-Strong Storm intervals. This is currently considered to be low confidence. Geomagnetic activity is likely to gradually ease to Quiet to Unsettled during Day 4 (27 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to be at background levels with just a very slight chance of solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	60	20	5
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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